From:	FEMA-NRCC-ohul
To:	Mason, Steve
Cc:	EOC Liaison
Subject:	FW: DOI Unmanned Aircraft Systems
Date:	Thursday, August 31, 2017 5:48:57 PM
Attachments:	DOI UAS Fleet.docx DOI UAS Capabilities and Products.docx

Steve,
DOI has 9 Unmanned Aircraft Systems and pilots that are available for our use. Would these be useful for reconnaissance at the Arkema facility? Attached are two informational sheets on the assets.
Jen
Jen Mosser, NRCC ESF-10 Oil and Hazmat Unit Lead
FEMA-NRCC-ohul@fema.dhs.gov
202-212-2466 ESF 10 Desk Unit Leader

From: FEMA-NRCC-DOI
Sent: Thursday, August 31, 2017 5:54 PM
To: FEMA-NRCC-ohul
Subject: RE: DOI Unmanned Aircraft Systems
I'm pretty sure they are the solo quad copters (3 ea), but our team lead could provide more info on capabilities. Info below. We have the other resources on standby, so theoretically we could mobilize other assets.
Gil Dustin
BLM National Aviation Office
Unmanned Aircraft Systems
gdustin@blm.gov
O: 208-387-5181
C: 970-210-6153
F: 208-387-5199
Kevin
NRCC DOI Liaison
202-212-8220 –Desk
fema-nrcc-doi@fema.dhs.gov

From: FEMA-NRCC-ohul
Sent: Thursday, August 31, 2017 5:42 PM
To: FEMA-NRCC-DOI
Subject: RE: DOI Unmanned Aircraft Systems
Thank you, Kevin. There are four types of UAS on the info sheet, are all four types available?

From: FEMA-NRCC-DOI
Sent: Thursday, August 31, 2017 5:33 PM
To: FEMA-NRCC-ohul
Subject: DOI Unmanned Aircraft Systems
Hi Jen,
As mentioned, DOI has 9 Unmanned Aircraft pilots and aircraft in College Station. They have been supporting ESF-9, but those missions seem to be ending. Just wanted to share the capability in case

ESF-10 had any need for support. Attached is some info on capability. A new MA or update would probably be required. Happy to connect your field folks with the Team Lead for more specific discussions.

Kevin
NRCC DOI Liaison
202-212-8220 –Desk
fema-nrcc-doi@fema.dhs.gov

Department of Interior
Unmanned Aircraft Systems

Capabilities and Products

Summary

The Department of the Interior (DOI) has an established Unmanned Aircraft Systems (UAS) program with various vehicles, sensors, data-processing, and products available to assist with Hurricane Harvey response. Currently, the UAS available for response is limited to a quadcopter vehicle that can be adapted to carry various sensors: A digital video camera, still camera, thermal camera, and multi-spectral camera.

Current vehicle operations are limited by precipitation and wind, as well as launch site location. The vehicle weighs less than 4 lbs, measures 10”x18”x18”, and can fly up to 20 minutes at a time. Antenna range between the controller and vehicle range up to half a mile vertically and over 400’ vertically, with maximum speed of 55 mph.

Software and computing capabilities in possession of DOI include: flight planning and basemap creation; the ability to geotag both photos and video; and the ability to process and large store telemetry and imagery datasets (multi-TB). Products available include: geotagged photos and geotagged videos ranging from horizontal view to nadir (birds eye), orthoimagery, digital surface models, 3D image models, thermal imagery, and multi-spectral imagery.

Capabilities

Vehicle:
3DR Solo
Sensors:

- GoPro Hero4
- Ricoh GRII
- FLIR VUE PRO
- Micasense

Planning/Processing Software:

- Mission Planner
- Agisoft PhotoScan
- ArcGIS, Full Motion Video

For more information regarding UAS operations in Texas, contact Gil Dustin, 970-210-6153.

For more information on the DOI UAS program including privacy, regulations, policy, operator certification, etc., please visit the website or contact Brad Koeckeritz, Division Chief, Unmanned Aircraft Systems, 208-433-5091.

DOI UAS Fleet

Photo Credit: 3DR

3DR Solo Quadcopter

Specifications

Height: 10 in. (25 cm)

Motor-to-motor dimension: 18 in. (26 cm)

Propulsion: 880 KV motors, two clockwise rotating motors and two counterclockwise rotating motors

Propeller: 10 in. x 4.5 in. (25 cm x 11.4 cm)

Weight with battery: 3.3 lbs. (1.5 kg)

Estimated flight time: 25 minutes

Maximum altitude: 328 ft. (100 m)

Range: .5 miles** (.8 km)

Cruise speed: 5.7 mph (2.5 m/s)

Maximum speed: 55 mph (25.5 m/s)

Maximum climb rate: 11 mph (5.0 m/s)

Maximum descent rate: 5.5 mph (2.5 m/s)

Headwind limitation: 25 mph (11 m/s)

Crosswind limitation: 25 mph (11 m/s)

Operating temperature: 32° F - 113° F (0° C - 45° C)

Operating relative humidity: 0-85% RH

Payload capacity: 1.1 lbs. (500 g)

Photo Credit: Pulse Aerospace

Pulse Vapor 55TM Helicopter

Capabilities

The Pulse Aerospace Vapor 55TM is a tactical helicopter, unmanned aircraft system (UAS) capable of carrying larger payloads up to 24 lbs. Payload options include survey-grade airborne lidar and next generation high definition EO/IR brushless gimbals. The Vapor 55TM includes an extensive safety feature set, a precision fullauthority automatic flight control system, and easy to operate touchscreen ground control station. The Vapor 55TM carries a 12 lb., front mounted sensor for up to 60 minutes on a single charge. Larger payloads can also be carried. The Vapor 55TM utilizes automatic rotor speed

Specifications

Main Rotor: Diameter 90 in
Dimensions: 77 x 26 x 23
Maximum Takeoff: Weight 55 lbs
Empty Weight: 19 lbs
Payload Weight: 10 lbs (33 lbs useful load)
Data Link: 2.4 GHz & 900 MHz, High Bandwidth, Encrypted, Digital **Endurance (Hover):** 45 Minutes
Endurance (Cruise): 60 Minutes
Operational Radius: 5 Miles
Cruise Speed: 25 mph Ceiling: 15,000 ft
Take Off Type: Automatic Vertical Take Off
Landing Type: Automatic Vertical Landing

calibration for altitudes from sea level to over 10,000ft AMSL.

For More Information

Drive: Electric power plant with 2 stage transmission, torque tube tail drive, lithium battery

Avionics: Fully automatic flight control system, 3 or 5 axis redundant IMU options, Honeywell Digital Magnetometer, Survey Grade GPS + Glonass positioning

Aerodynamics: 3 blade semi-rigid fly-bar-less main rotor, high efficiency carbon fiber blades

Payload Compatibility: HD EO/MWIR brushless camera ball, Riegl VUX-1 LiDAR with survey grade GNSS/IMU, High resolution aerial photography imagers

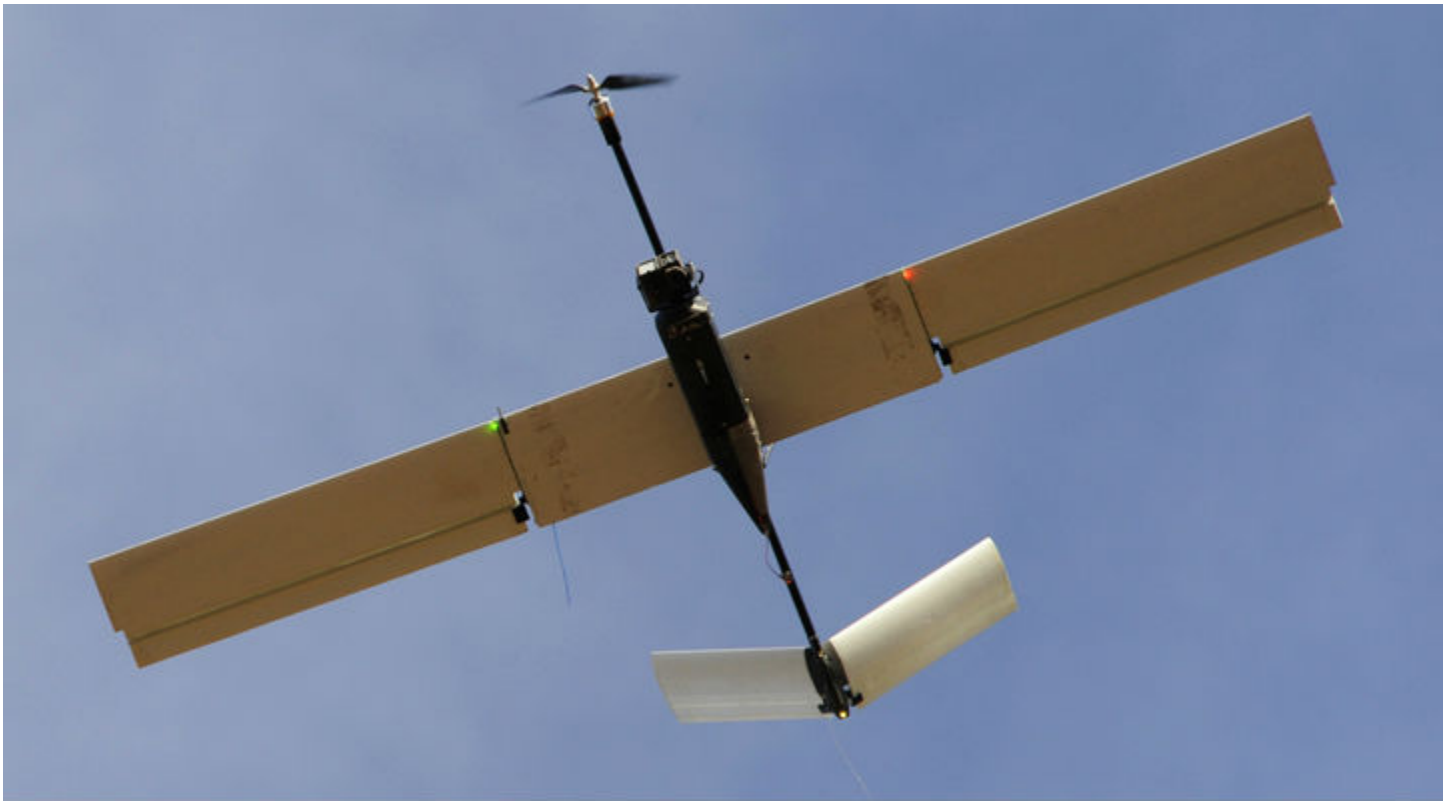

Photo Credit: Falcon Unmanned

Fixed Wing Falcon

Capabilities

Falcon is a tactical, fixed wing, unmanned aerial vehicle (UAV). The Falcon is designed around a modular payload and airframe design concept allowing for multi-mission capabilities, easy setup, and simple logistics for long term support. Falcon is single person portable system which may be operated by a single individual and is transported in a custom soft bag with backpack straps, shoulder sling, and hand holds for easy transport. Falcon and Falcon Hover utilize interoperable components including shared payloads, shared batteries, and a shared ground control station.

Falcon is bungee launched using a single bungee cord attached to any object/structure that can withstand the pull force of 15lbs (8kg). Example launch attach points include trailer hitches, roots, branches, tree trunks, brush, fence posts, a stake in the ground, and even a person holding the end of the bungee. The bungee launch provides most of the energy for launch thereby reducing the physical strength requirements to launch the aircraft. The bungee launch also directs the aircraft along a desired launch path and gains altitude rapidly allowing for operations in tightly constrained locations

Specifications

Communications: Secure Digital Datalink (Up to 256 bit AES encryption)
Autopilot: Pixhawk Autopilot by 3D Robotics
Sensor Suite: Ublox GPS, Barometric Pressure Sensor, Dynamic Pressure Sensor, Redundant 3 Axis Accelerometers, Redundant 3 Axis Rate Gyros
Control Modes: GPS Waypoint Navigation and Multiple Semi-Autonomous Flight Modes
Launch Method: Bungee Hand Launch / Bungee Rail Launch
Recovery Method: Parachute or Belly Landing
Endurance: 60+ min (operations/mission dependent)
Assembly: Less than 2 min
Ready to Launch: Less than 10 minutes
Take Off Weight: Up to 12 lb (Payload Dependent)
Payload Weight: Up to 2.5lbs
Flight Endurance Range: 30-60 miles
Communications Range: 6+ miles (terrain / antenna dependent)
Dash Speed: 45 knots
Cruise Speed: 27 knots
Operating Altitude: Up to 2000 ft AGL
Service Ceiling: Tested to 12,000 ft, estimated maximum altitude of 15,000 ft MSL
Assembled Dimensions: 96" width (span) x

including forested areas, narrow paths, roadways, parks, parking lots, etc.

17" height x 54" length

Packed Dimensions: 14" width x 7" height x 54" length

Falcon uses a parachute recovery as the primary landing method however a secondary landing method is a conventional belly landing. The parachute recovery allows for recovery in constrained environments as well as areas with rugged ground cover. During a parachute recovery the aircraft lands motor first.

For More Information

Photo Credit: Falcon Hover

Falcon Hover

Capabilities

Falcon Hover (or Hover) is a tactical, quadcopter, unmanned aerial vehicle (UAV) with a top mounted fuselage capable of front mounted and bottom mounted payload options.

Specifications

Communications: Secure Digital Datalink (Up to 256 bit AES encryption)

Autopilot: Pixhawk Autopilot by 3D Robotics

Sensor Suite: Ublox GPS, Barometric Pressure

Falcon Hover is designed around a modular payload and airframe design concept allowing for multi-mission capabilities, easy setup, and simple logistics for long term support. Hover is a single person portable system which may be operated by a single individual and is stored in a custom soft bag with hand holds for easy transport. Falcon and Falcon Hover utilize interoperable components including shared payloads, shared batteries, and a shared ground control station.

Falcon Hover is a Vertical Take Off and Landing (VTOL) aircraft. The VTOL launch and recovery of the aircraft allow for operations in tightly constrained locations including forested area, narrow paths, roadways, parks, parking lots, etc. Takeoffs and landings can be conducted in areas smaller than 8ft x 8ft.

For More Information

Sensor, Dynamic Pressure Sensor, Redundant 3 Axis Accelerometers, Redundant 3 Axis Rate Gyros

Control Modes: GPS Waypoint Navigation and Multiple Semi-Autonomous Flight Modes

Launch Method: Vertical Takeoff

Recovery Method: Vertical Landing

Endurance: 20-25+ min @ 5,800' MSL (operations/mission dependent)

Assembly: Less than 2 minutes

Ready to Launch: Less than 5 min

Take Off Weight: Up to 7.5 lb (Payload Dependent)

Payload Weight: Up to 2.5 lbs Flight Endurance Range: 2+ Miles

Communications Range: 6+ Miles (terrain / antenna dependent)

Speed: 0 to 15 knots

Operating Altitude: Up to 1000 ft AGL

Service Ceiling: Tested to 10,000 ft, estimated maximum altitude of 15,000 ft MSL

Assembled Dimensions: 48" maximum tip to tip / 6" tall (without modular legs)

Packed Dimensions: 9" wide x 7" height x 24" length